UNITED NATIONS

A

General Assembly

Distr.
GENERAL

A/AC.105/497
4 December 1991

ORIGINAL: ENGLISH

COMMITTEE ON THE PEACEFUL USES
OF OUTER SPACE

REPORT OF THE UNITED NATIONS EXPERT ON SPACE APPLICATIONS TO THE SCIENTIFIC AND TECHNICAL SUBCOMMITTEE

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INTRODUCTION

1. At its twenty-eighth session, held in New York from 19 February to 1 March 1991, the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space reviewed the activities of the United Nations Programme on Space Applications (hereafter referred to as "the Programme"). The Subcommittee noted that the activities of the Programme for 1990 had been carried out satisfactorily and that the activities scheduled for 1991 had been endorsed by the General Assembly in its resolution 45/72 of 11 December 1990. The Subcommittee recommended to the Committee on the Peaceful Uses of Outer Space, for its approval, the activities scheduled for 1992 under the regular budget and took note of other Programme activities, all of which are to be implemented as part of the space-applications-related recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82), as proposed by the Expert on Space Applications in his annual report (A/AC.105/478) submitted to the Scientific and Technical Subcommittee at its 1991 session.

I. MANDATE OF THE PROGRAMME

2. The United Nations Programme on Space Applications operates within the scope of its expanded mandate as contained in General Assembly resolution 37/90 of 10 December 1982, taking into account the recommendations of UNISPACE 82, with special emphasis on the following activities: (a) provision of long-range fellowships for in-depth training; (b) provision of technical advisory services to Member States and regional institutions upon request; (c) organization of a series of regional and international training courses, seminars, workshops and technical expert meetings for the benefit of specialists, educators, managers and decision-makers in order to enhance their technical capabilities as well as to keep them abreast of ongoing developments in the discipline; (d) provision of assistance in the development of indigenous capability at the local level; (e) acquisition and dissemination of space-related information; and (f) promotion of greater cooperation between developed and developing countries, as well as among developing countries. Presented below is a summary of the activities carried out in 1991, including those scheduled for implementation in 1992 and those proposed for 1993.

3. In its resolution 44/46 of 8 December 1989, the General Assembly, in endorsing the recommendation of the Committee regarding the participation of the United Nations in International Space Year (ISY), also directed that "the training and educational capabilities of the United Nations Programme on Space Applications should be utilized to bring about a meaningful role for the United Nations." The efforts of the Programme in this regard are identified in chapter V and in annex I to the present report, as well as in document A/AC.105/445/Add.6.

A. Long-term fellowship programmes for in-depth training

4. The Programme received 18 long-term fellowship offers for the 1991/92 period from the Governments of Austria (2), Brazil (10) and China (2), as well as from the European Space Agency (ESA) (4); all of these fellowships have been renewed for the 1992/93 period. The status of the 1991/92 awards and the recipients' countries are set out in annex II to the present report. Details of the offers are presented below.

5. The two fellowships offered by the Government of Austria are for in-depth training in microwave technology, each for a period of one year from 1 October 1991 to 30 September 1992. The fellowships are tenable at the Technical University Graz, Graz, Austria.

6. The 10 long-term fellowships offered by the Government of Brazil are for research and applications in remote sensing technology and are tenable at the Instituto Nacional de Pesquisas Espaciais (INPE), São José dos Campos, State of São Paulo, Brazil. The fifth set of participants in this fellowship series, selected from countries of the Latin American and the Caribbean region (ECLAC) and from Africa, completed their nine months of training at INPE on 30 November 1991. The next set of participants will be selected from among candidates from Spanish-speaking countries of the ECLAC region and will undergo their training at INPE from 14 March to 14 November 1992.

7. The two fellowships offered by the Government of China, each for a period of one year, are for research and training in geodesy, photogrammetry and remote sensing. The fellowships are tenable at Wuhai Technical University of Surveying and Mapping, Wuhai, China.

8. The four fellowships offered by ESA, each for a period of one year, are for research and study in the following disciplines and ESA's institutions:

(a) Space antennae and propagation: European Space Research and Technology Centre, Noordwijk, the Netherlands;

(b) Communications systems: European Space Research and Technology Centre, Noordwijk, the Netherlands;

(c) Remote sensing information systems: European Space Research Institute, Frascati, Italy;

(d) Satellite meteorology: European Space Operations Centre, Darmstadt, Germany.

B. Technical advisory services

9. The Programme is collaborating with ESA to conduct a survey and undertake field reviews of projects that could benefit from the remote sensing data being made available by ESA to African countries that are within the perimeters of ESA's two ground-receiving stations in Maspalomas (Canary Islands), Spain, and Fucino, Italy. The projects submitted by these countries are currently being reviewed by the United Nations and ESA. The aim of the United Nations/ESA assistance is to make available historical, current and future data from different satellites so that they may be used to support development programmes in different application projects, particularly irrigation, roads, water resources and agriculture in these countries. ESA is providing the financial support for this activity.

10. The Programme is assisting Member States that are within the perimeter of the ground receiving station at Cotopaxi, Ecuador, to fully utilize this facility. In November 1990, the Programme advised the Government of Ecuador to make its Cotopaxi station a subregional station that could be financially supported by the countries within the subregion. This advice was accepted and is being carried out through ongoing subregional meetings and negotiations. A workshop that would accelerate this process is being funded by the Government of Japan and is planned for March 1992 (see para. 28 (a) below).

11. The Programme assisted the Economic and Social Commission for Western Asia (ESCWA) to organize a two-day plenipotentiary meeting on the "Centre for Space Science and Technology Education for Western Asia". The meeting was organized at Sultan Qaboos University, Muscat, Oman, on 21 and 22 December 1991, in order (i) to explain the importance of the Centre to the region and the significance of its planned functions and (ii) to enhance the prospects for fund-raising for the Centre in the region.

C. United Nations training courses/workshops

1. Activities carried out in 1991

12. In 1991, the United Nations conducted three training courses and three workshops under the auspices of the Programme. A summary of each of these activities is presented below. In addition, the Programme financially supported and co-sponsored a United Nations/Food and Agriculture Organization of the United Nations (FAO)/United Nations Environment Programme (UNEP) Seminar on Remote Sensing for Decision-Makers, organized in cooperation with the Economic Commission for Africa (ECA) and held at UNEP Headquarters, Nairobi, from 26 to 31 August 1991.

Bangalore, India: Basic Space Science Workshop

13. The first United Nations Workshop on Basic Space Science for Development was organized in cooperation with the Government of India. The Workshop was hosted by the Indian Space Research Organization (ISRO) and held at the ISRO Satellite Centre, Bangalore, India, from 30 April to 3 May 1991.

14. Since the scientific, economic and social progress of any country is strongly interrelated, the pursuit of basic science is important in finding solutions to the problem of development. Thus, the Workshop was organized for the purpose of (i) creating and improving the awareness of scientists regarding current and future scientific and technical activities of basic space science, (ii) enhancing national capabilities to develop programmes and to undertake research activities in basic space sciences, (iii) enhancing scientific cooperation among the developing countries, including the exchange of scientific information, (iv) fostering international collaboration and (v) exploring avenues of education, training and research on space science subjects. The plenary sessions focused on the importance of basic space science for developing countries and international cooperation in the field. The special sessions included topics of planetary environment, planetary atmosphere, space plasma processes, solar system science and planetary exploration, space astronomy and astrophysics.

15. The Workshop was attended by 40 scientists from 15 countries and three international organizations. Participating experts funded by their respective Governments/institutions were from Canada, Japan, the United States of America and ESA. Funds allocated by the United Nations and ESA were used to defray the cost of international air travel and a daily subsistence allowance for 20 foreign participants. The Government of India provided conference facilities, local transportation and room and board for the 20 participants, and funded the participation of its own experts at the Workshop. A detailed report on the Workshop is contained in document A/AC.105/489. The proceedings of the Workshop will be published in the Conference Proceedings Series of the American Institute of Physics (AIP).

Maspalomas, Spain: Microwave Remote Sensing Technology Workshop

16. The United Nations/FAO/ESA Workshop on Microwave Remote Sensing Technology was organized in cooperation with the Government of Spain for the benefit of participants from the ECA and ESCWA regions. The Workshop, which was hosted by the Instituto Nacional de Técnica Aeroespacial (INTA) - Maspalomas Space Station, Canary Islands, was held from 10 to 14 June 1991, with the participation of 34 experts from 17 Member States and three international and intergovernmental organizations; 17 of the experts represented 14 developing countries from the ECA and ESCWA regions.

17. The objectives of the Workshop were (i) to expose the participants to various aspects of current and future microwave remote sensing systems, including the acquisition, processing, archiving and utilization of the data generated by such systems; and (ii) to provide opportunities for the participants to discuss among themselves and with representatives of the developers and operators of these systems, issues related to accessibility and availability of data, potential applications of such data and the education and training programmes that would be necessary in order to derive significant benefits from its utilization. To achieve these goals, the Workshop programme included a number of technical presentations and working group sessions. The Workshop noted that through a variety of mechanisms, data obtained by

microwave sensor systems could be made available to the scientific and user communities. However, the use of such data would require significantly more intensive education and training than those required in the transition from aerial photo-interpretation to satellite remote sensing.

18. Funds were provided by the United Nations, FAO and ESA to defray the cost of international air travel and per diem of the participants from developing countries. The Government of Spain, through INTA, provided conference facilities and local transportation for all participants and funded the participation of its own experts at the Workshop. A detailed report on the Workshop is contained in document A/AC.105/493.

Beijing: Workshop on the Application of Space Techniques to Combat Natural Disasters

19. The United Nations/Economic and Social Commission for Asia and the Pacific (ESCAP)/Office of the United Nations Disaster Relief Coordinator (UNDRO)/Workshop on the Application of Space Techniques to Combat Natural Disasters was organized in cooperation with the Government of the People's Republic of China and held at Beijing from 23 to 27 September 1991. The Workshop, organized for the benefit of Member States of the ESCAP region, was hosted by the State Science and Technology Commission of China (SSTCC). The objective of the Workshop was to expose the participants to various aspects of current and future techniques and systems associated with remote sensing, satellite meteorology, satellite communications and satellite positioning systems that could be useful in forecasting, monitoring and mitigating the effects of such natural disasters as severe weather phenomena, flooding, drought, earthquakes and volcanic eruptions. It also addressed the development of databases and the use of Geographic Information Systems (GIS) to monitor disaster-related activities and problems including desertification, erosion processes and the impact of atmospheric changes. The Workshop noted that the ESCAP region was very prone to disasters and that many countries of the region had come to appreciate the growing importance of using space technology to combat natural disasters. The working group sessions of the Workshop deliberations focused on causes of disasters; prevention, preparation, warning, relief and assessment of disasters; and combating disasters in the ESCAP region.

20. The Workshop was attended by 72 participants from 10 countries of the ESCAP region and 9 national and international organizations with expertise in combating disasters. Funds allocated by ESCAP, UNDRO and the United Nations for the organization of the Workshop were used to defray the costs of international air travel and incidental expenses of 17 participants. The Government of China, through SSTCC, provided the Workshop facilities and local transportation for the duration of the Workshop, as well as room and board for 17 participants; it will also publish the proceedings of the Workshop. Participating experts funded by their respective Governments/institutions were from China, France, Japan, the United States, FAO, ESCAP, UNDRO, UNESCO, ESA, INMARSAT and the United Nations (Outer Space Affairs Division). A detailed report on the Workshop is contained in document A/AC.105/494.

Sioux Falls, South Dakota (United States): United Nations International Training Course on Remote Sensing Applications for Environmental Assessment and Monitoring

21. The United Nations International Training Course on Remote Sensing Applications for Environmental Assessment and Monitoring was organized in cooperation with the Government of the United States through the United States Geological Survey (USGS), the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA). The Course, organized principally for the benefit of developing countries, was hosted by the USGS Earth Resource Observation System (EROS) Data Center, Sioux Falls, South Dakota, from 9 September to 4 October 1991.

22. The objective of the Course was to develop the practical knowledge and skills of participants in the multidisciplinary use of data sets, including remotely sensed data, for environmental study and resources management. The programme was designed to provide practical training in the processing and applications of satellite and other types of spatial data as well as training in the analysis of such data for land processes, using GIS. Instruction consisted of lectures, demonstrations of processing technology, hands-on operations of digital data and practical exercises.

23. The Course was attended by 23 participants and 2 observers from 25 countries. The United Nations was responsible for the overall external organizational arrangements and the United States Government coordinated international air-travel and local arrangements, provided the cost of international air travel and a daily subsistence allowance for 23 participants and funded the participation of instructors from the United States. FAO and UNEP each funded the participation of one instructor. A detailed report on the Course is contained in document A/AC.105/499.

Potsdam, Germany: Third United Nations Training Course on Geological Sciences

24. The Third United Nations International Training Course on Remote Sensing Applications to Geological Sciences, organized in cooperation with the Government of Germany through the Carl Duisberg Gesellschaft e.V. Berlin, was hosted by the Central Institute for Physics of the Earth, Potsdam, and the Free University of Berlin, from 7 to 25 October 1991. The main objective of the Course was to provide education and practical training to participants from developing countries on the applications of airborne and satellite remote sensing techniques to geological sciences. The programme of the Course covered (i) the fundamentals of remote sensing (analogue-optical and digital image processing, classification procedures, geostatistics, analysis of geological units, lineament analysis, field checking), (ii) interpretation and development of geological models (remote sensing for economic geology, documentation of results) and (iii) geological fieldwork in two areas of the Central European Hercynides in the eastern part of Germany.

25. The 20 participants in the Course were from 18 countries. The United Nations provided international air travel as well as a partial daily

subsistence allowance to 15 of the participants. The European Space Agency provided air travel and per diem to five participants. The Government of Germany, through the Carl Duisberg Gesellschaft e.V., provided room and board and local transportation for all participants for the duration of the Course as well as all necessary facilities. Lecturers at the Course included specialists from Finland, Germany, Italy, the Netherlands, the Union of Soviet Socialist Republics and the European Space Agency. The report on the Course is contained in document A/AC.105/495. The proceedings of the Training Course are being published in the Berliner Geowissenschaftliche Abhandlungen of the Free University of Berlin.

Lima: Sixth United Nations/World Meteorological Organization (WMO)/ESA Training Course on Microwave Remote Sensing

26. The Sixth United Nations/WMO/ESA Training Course on the Use of Visible, Infrared and Radar Sensor Systems in Hydrological and Agrometeorological Applications was held from 7 to 25 October 1991 at Lima. The Course was organized in cooperation with the Government of Peru for the benefit of ECLAC member States and was hosted by the Comision Nacional de Investigacion y Desarrollo Aeroespacial (CONIDA). The Course provided the participants with practical knowledge on the type and use of information obtainable by satellite sensor systems, particularly in the fields of hydrology, agrometeorology, forestry, geology and oceanography. Lectures and practical exercises focused on digital image processing, the theory of radar imaging and on the analysis and interpretation of these images as well as on the integration of data from multi-sensor systems using GIS.

27. The Course was attended by 19 participants from 14 countries of the ECLAC region and five other participants from space-related institutions of Peru; 4 observers from Peru also attended the lectures. The lectures and practical exercises were conducted by experts from Canada Centre for Remote Sensing, Intera Kenting (Canada), CONIDA (Peru), the Universidad Nacional Agraria (Peru), the European Space Agency, the World Meteorological Organization (WMO) and the United Nations (Outer Space Affairs Division). Funds allocated by the United Nations, WMO and ESA were used to defray the cost of international air travel and per diem of the foreign participants. The Government of Peru, through CONIDA, provided the conference facilities, computer equipment and supplies for the practical exercises. A detailed report on the Course is contained in document A/AC.105/496.

2. Activities scheduled for implementation in 1992

28. The following training courses, workshops and conferences are scheduled for 1992 (see annex I to the present report for a summary of these activities):

(a) A United Nations Workshop on Space Technology for Resource Development and Environment Management for the benefit of ECLAC Member States will be organized at Quito in cooperation with the Governments of Ecuador and Japan from 9 to 13 March 1992. The Workshop will expose resource managers and

directors of environmental and development planning programmes in the ECLAC region to current and future Earth observation systems, including the acquisition, processing, archiving and application of data generated by such systems. The Workshop will provide the participants with the knowledge on how to utilize such data for impact assessment of developmental activities and for the protection of the environment. The Workshop will also familiarize the participants with the specific functions of the CLIRSEN-Cotopaxi satellite receiving station in Ecuador and the INPE-Cuiaba station in Brazil. Through working group discussions, the participants will formulate necessary regional cooperation programmes that could utilize the capabilities of the stations.

(b) The Second United Nations/Sweden Training Course on Remote Sensing Education for Educators will be held from 11 May to 12 June 1992 in Stockholm and Kiruna, Sweden, in cooperation with the Government of Sweden. The Course will be hosted on behalf of the Government by the Swedish Agency for International Technical and Economic Cooperation, the Swedish Space Corporation Satelitbild and the University of Stockholm. The main objective of the Course is to develop the practical knowledge and skills of university educators from the developing countries, within the international community, in remote sensing technology. The programme of the Course will also provide participants with a basic understanding of the development and use of remote sensing technology in natural resource management and environmental planning; a further goal will be to equip them with the ability to introduce elements of the technology, as appropriate, into the education curricula in their universities and institutions and to serve as a focal point in their own countries.

(c) A United Nations/ESA/Planetary Society Workshop on Basic Space Science for Development will be held at San José, Costa Rica, in cooperation with the Government of Costa Rica in July. The Workshop is being organized in recognition of the fact that the scientific, economic and social developments and progress of countries are strongly interwoven and that basic space science, including the physical and mathematical sciences, plays an important role in providing locally derived solutions to problems of development in general. The objective of the Workshop is to enhance scientific cooperation among scientists from developing countries in the ECLAC region and jointly target research projects of significant value in basic space science, for the benefit of the region.

(d) A United Nations International Conference on Satellite Remote Sensing for Resource Management, Environmental Assessment and Global Change Studies is to be co-sponsored and hosted by the Government of the United States at Boulder, Colorado, from 17 to 21 August 1992. The Conference will address satellite remote sensing for resource management, environmental assessment and global change studies: needs and applications in the developing world. The conference format will consist of sessions that will focus on user needs from the developing world perspective; data sources to meet user needs; applications to meet user needs; and opportunities for the future. Each conference topic will consist of several sessions which will include presentations from expert panelists. Each panel will also have time devoted to in-depth discussion.

(e) The Seventh United Nations/FAO/WMO/ESA Training Course on the Use of Visible, Infrared and Radar Systems in Hydrological and Agrometeorological Applications for the benefit of ECA and ESCWA Member States is scheduled to be organized at the Regional Centre for Services in Surveying, Mapping and Remote Sensing (RCSSMRS), Nairobi, in September/October 1992. The objective of the Course is to provide participants from countries of the ECA and ESCWA regions with practical knowledge on the type and use of information that can be obtained in the visible, infrared and microwave regions of the electromagnetic spectrum, particularly for hydrological, agrometeorological and forestry applications. The Course also aims at making participants aware of the characteristics of data from current and future satellite systems, including those being obtained via microwave remote sensing. Opportunities will also be provided for practical exercises in various application areas.

(f) The Fourth United Nations Training Course on Remote Sensing Applications to Geological Sciences is to be organized in cooperation with the Government of Germany, through the Carl Duisberg Gesellschaft e.V. Berlin, and will be hosted by the Central Institute for Physics of the Earth, Potsdam, and the Free University of Berlin, in October 1992. This training course will provide education and practical training to participants from the developing countries on the applications of airborne and satellite remote sensing techniques to geological sciences. The course will also demonstrate to the participants how to develop and apply techniques for extracting information and for merging disparate data sets that can be used for evaluating geological formations and their selected occurrences.

(g) A United Nations Conference on Communications Technology for Development is planned for the benefit of ESCAP member States in November 1992. The Conference is intended to bring together appropriate key policy makers and planners with the primary objective of reviewing the current and future roles of telecommunications in rural communications, tele-medicine (disaster medicine, remote health care delivery and public health settings in the region, disaster mitigation, tele-education and data transmission. To accomplish these objectives, the programme of the conference will be structured to include both scientific presentations and panels. The conference setting should allow for both a review of the current practices and for constructive discussions on future opportunities in the telecommunications industry.

3. Activities proposed for implementation in 1993

29. The following training courses, seminars and conferences are proposed for 1993:

(a) United Nations Seminar on Communications for Development for the benefit of countries in the Mediterranean and adjacent areas, to be held at Athens;

(b) United Nations Workshop on the Use of Space Techniques for Monitoring and Control of the Desert Environment for the benefit of ESCWA member States;

(c) United Nations Regional Conference on Space Technology for Sustainable Development for the benefit of ESCAP member States, to be held at Jakarta;

(d) International Training Course on Communications Technology for Development;

(e) Regional Training Course on Remote Sensing Applications to Geological Sciences for the benefit of ESCAP member States;

(f) United Nations/ECA Space Conference on Africa: Addressing Africa's Management Needs;

(g) United Nations Regional Workshop on Basic Space Science in Development Programmes for the benefit of ECA member States;

(h) United Nations/UNDRO Regional Workshop on Space Technology to Combat Natural Disasters for the benefit of Member States in the ECLAC region.

D. Development of indigenous capability

30. In 1991, most of the activities on the establishment of the Centres for Space Science and Technology Education focused on seeking necessary financial, material and institutional support for the Centres. These efforts included consultations with (i) Member States who could be potential donors in support of the Centres, (ii) potential host countries, (iii) UNDP headquarters in New York (the Regional Bureaux and the Bureau for Programme Policy and Evaluation) and (iv) the regional economic commissions. Countries visited in category (i) included Australia, Canada, Finland, Germany, the Netherlands, Norway, Spain, Sweden and the United States. Plans are in progress to undertake additional fund-raising missions to other countries that could support the Centres.

31. The next phase of the project is the organization of evaluation missions to the Centres' potential host countries and institutions. The evaluation missions will assess the viability of the potential host institutions, i.e., existing/planned infrastructure; institutional, governmental, financial and material support; existing educational programmes; existing/planned communication systems and any other support that could enhance the work of the Centres.

32. The evaluation missions would be undertaken only after a reasonable financial commitment has been received by the United Nations for the establishment of the Centres, either from the donors or from the potential host and benefiting countries. In this connection, on 18 November 1991, the Secretariat of the United Nations requested detailed information from each of

the potential host countries on their proposed contributions (personnel, space, equipment and monetary) to support the Centre in their respective region.

33. The United Nations Secretariat has also received a number of views from Member States, the United Nations system and the international scientific organizations on the establishment of the Centres. These views and other pertinent information about the Centres, including background, programme, current status and the response of the potential host countries to the questionnaire referred to in paragraph 32, are contained in document A/AC.105/498.

E. Information systems

34. The directory on "Education, Training, Research and Fellowship Opportunities in Space Science and Technology and its Applications" (A/AC.105/432) was published in 1989, and its addendum 1 in 1990; it will be reissued in 1992.

35. The directory on "Information Systems on Space Science and Technology" (A/AC.105/397/Rev.1) was published in 1988; it will be reissued in 1992.

36. The third publication of selected papers (on remote sensing and satellite communications) from the activities of the Programme that were conducted in 1991 has been issued as document A/AC.105/492.

F. Promotion of greater cooperation in space science and technology

37. Through the Programme, the United Nations co-sponsored, with the Government of Canada and the International Astronautical Federation (IAF), a pre-conference workshop on Space Technologies for Development, from 2 to 5 October 1991, at the 42nd IAF Congress held at Montreal, Canada, from 5 to 11 October 1991. The Workshop examined ways in which developing countries could (i) identify specific space technologies and related applications that could make a significant contribution to their priority areas of development at an affordable cost; and (ii) develop appropriate programmes in those technologies and applications. Discussions at the workshop focused on how officials and agencies responsible for communications, resource management and industrial development could identify, organize, finance and manage space activities that could be adapted to the particular needs and capabilities of their countries. Special consideration was given to the development of space systems and capabilities through international cooperation. The co-sponsors provided air travel and per diem for 23 participants from 16 developing countries.

38. The United Nations and IAF also co-sponsored a special session on "Space Technology for Agricultural Management" during IAF's 42nd Congress at Montreal in October 1991. Five specialists from the developing countries who

participated in the United Nations/Canada/IAF Workshop were invited to make specific contributions to the deliberations of the special session.

39. The United Nations sponsored the participation of an expert from Argentina in the Fifth Symposium of the Society of Latin American Professionals Specializing in Remote Sensing (SELPER), held at Cuzco, Peru, from 28 October to 1 November 1991.

40. The Programme is co-sponsoring a United Nations/Committee on Space Research (COSPAR)/IAF Symposium on "Space Technologies in Developing Countries - Making it Happen", to be held in Washington from 28 to 30 August 1992 during the World Space Congress, 28 August-9 September 1992. The Symposium will be attended by scientists from the international community and will afford opportunities for dialogue on current and future space systems, as well as the participation of the developing countries in specific activities that can contribute to their social and economic development. It will also provide opportunities for the forging of scientific partnerships among these scientists and their countries for the attainment of these goals.

41. A United Nations/International Society for Photogrammetry and Remote Sensing (ISRPS) Workshop on Data Analysis, Methods and Applications will be held on 6 and 7 August 1992 during the 17th Congress of ISPRS, to be held in Washington from 2 to 14 August 1992. The Workshop will provide a forum for scientists with expertise in algorithms, software development, software systems and hardware employed in the reduction and analysis of data and their applications. It will foster communication between developers and users of such systems, i.e., those with a wide range of expertise in the production and use of software packages for photogrammetry and remote sensing applications. Contributions to the Workshop programme are being invited in the areas of algorithms, software systems and their applications, with emphasis on practical solutions to the problems of real data treatment.

II. VOLUNTARY CONTRIBUTIONS

42. The successful implementation of the 1991 activities of the Programme benefited from a variety of support and voluntary contributions from Member States and their institutions as well as from regional and international governmental and non-governmental organizations. Such support included voluntary contributions, both in money and in kind, and technical and scientific presentations by several experts, as detailed below:

(a) A number of Member States (Brazil, Canada, China, France, Germany, Greece, India, Japan, Pakistan, Peru, Spain and the United States provided support for the activities of the Programme in 1991 in various ways, including the following:

(i) Defrayal of the local expenses of candidates from developing countries in the long-term fellowship programmes (see paras. 5, 6, and 7 above and annex II);

(ii) Voluntary cash contributions received in 1991 from the Governments of Austria (US$ 9,000), Greece (US$ 7,000 and Pakistan (US$ 12,000);

(iii) Co-sponsorship of the activities of the Programme and, in particular, defrayal of the costs of participants' international air travel, local organization and facilities, room and/or board and local transportation (see paras. 15, 18, 20, 23, 25 and 27);

(iv) Sponsorship (travel and per diem) of experts from Member States to provide technical presentations and to contribute to the deliberations at these activities (see paras. 15, 18, 20, 23, 25 and 27);

(b) The European Space Agency defrayed the local expenses of candidates from developing countries in its long-term fellowship programmes (see para. 8, and annex II). ESA also contributed (US$ 75,000) in support of the United Nations workshops and training course held in Bangalore, India, Maspalomas (Canary Islands), Spain and Lima, Peru, respectively;

(c) UNDRO financially supported (travel and per diem) five participants and one of its experts at the United Nations Workshop on the Applications of Space Techniques to Combat Natural Disasters, held at Beijing;

(d) WMO financially supported five participants and one of its experts at the United Nations/WMO/ESA Training Course held at Lima;

(e) FAO financially supported three participants and one of its experts at the United Nations/FAO/ESA Workshop held at Maspalomas (Canary Islands), Spain;

(f) FAO, UNEP, the United Nations Educational, Scientific and Cultural Organization (UNESCO), ESA and the International Maritime Satellite Organization (INMARSAT) sponsored the participation of their experts (travel and per diem) in the activities described in paragraphs 13, 16, 19, 21 and 26 above.

III. FINANCIAL PROVISIONS AND ADMINISTRATION OF THE 1992 PROGRAMME ACTIVITIES

43. The 1992 Programme activities described in the present report will be implemented in the following manner:

(a) Financial provisions. Under the United Nations regular budget, an amount of $345,900 was approved by the General Assembly at its forty-sixth session for implementing the 1992-1993 biennium activities of the Programme. Because this budgetary allocation is insufficient to carry out the mandated and expanded activities of the Programme, it has become necessary to solicit additional funds, in the form of voluntary contributions, in support of these activities. These voluntary contributions are deposited into the Space

Applications Programme Trust Fund account and will be used to supplement the regular budget of the Programme.

(b) Administration by, and contributions and participation of staff. The Outer Space Affairs Division, and in particular the Expert on Space Applications and his staff, will carry out the activities described in the present report. In this connection, travel would be undertaken as appropriate by the Expert and his staff within the provisions of the biennium travel budget of the Outer Space Affairs Division as approved by the General Assembly at its forty-sixth session and, as may be necessary, from voluntary contributions.

(c) Consultations, instructors/speakers and technical materials. Up to 15 specialists in space science and technology and its applications would be required to serve as instructors, speakers and consultants during the implementation of the 1992 activities of the Programme. Expenses incurred in respect of the travel and per diem of these specialists and for necessary technical materials would be met partly from the amount specified in paragraph 43 (a) above and partly from voluntary contributions received from Member States and international organizations.

IV. EVALUATION OF THE IMPACT OF A NUMBER OF ACTIVITIES OF THE UNITED NATIONS PROGRAMME ON SPACE APPLICATIONS FOR 1990

44. It takes about one year for a candidate who has participated in the activities of the Programme to establish needed facilities and support at the local level before he/she could make meaningful use of the knowledge gained through the Programme. Thus, a survey of those who participated in the activities of the Programme in 1990 was carried out in 1991. The evaluation of the effectiveness of the Programme activities presented in this report is based on information received as feedback from these participants; the results of the evaluation are contained in the paragraphs that follow.

45. In 1990, the activities of the Programme included one training course held at Stockholm and Kiruna, Sweden, and three workshops held at Sao José dos Campos, Brazil; Rome, Italy; and Havana, Cuba. The course focused on the provision of remote sensing knowledge to educators; the workshops were devoted to microwave remote sensing technology, remote sensing and geo-information technology for decision makers, and space communications for development, respectively.

46. On 23 May 1991, a questionnaire was sent to the 54 individuals who participated in the above-mentioned activities of the Programme in 1990. The statistical evaluation of the total responses is given below.

47. A total of 58 participants, of the 79 who participated in these activities, responded to the questionnaire. The professional activities of several of the 58 participants have been in more than one area. Eight of the respondents continued working in communications, 2 in meteorology, 43 in

remote sensing, 19 in mapping, 13 in agriculture, 13 in forestry, 8 in hydrology, 6 in geology, 3 in mineralogy, 3 in fisheries and 11 in environmental sciences. Their post-meeting overall activities are summarized as follows:

	Number of participants
Research and development	17
Planning	20
Operational activities	13
Education	38

48. The table below gives the number of participants who expressed the view that their participation in the activities had enabled them to initiate, establish, run or direct the following groups, facilities or activities in their different professional fields:

	Initiate	Establish	Run
	(Number of participants)		
Study group	11	2	5
Coordination of user group	5	3	2
National committee	5	1	3
National programme	7	5	5
Regional/international cooperation	6	6	6
Data receiving station	2	1	3
Data analysis centre	2	6	3
Training facility	6	4	3

V. INTERNATIONAL SPACE YEAR 1992: PARTICIPATION OF THE UNITED NATIONS

United Nations guidebook on International Space Year

49. Additional contributions by Member States to United Nations ISY activities are described in document A/AC.105/445/Add.3. These new submissions have been incorporated in section D of the second edition of the booklet entitled "The Participation of the United Nations System in International Space Year".

50. The status of United Nations ISY activities as of 30 November 1991 is presented in document A/AC.105/445/Add.6.

ANNEX I. SPACE APPLICATIONS PROGRAMME - 1992*

Activities	Date	Place	Objective
1. United Nations Workshop on Space Technology for Resource Development and Environment Management for the benefit of ECLAC Member States in cooperation with Ecuador and Japan	9-13 March 1992	Quito, Ecuador	Expose resource managers and directors of environmental programmes to global Earth observation systems and the functions of the Cotopaxi and Cuiaba stations
2. Second UN/Sweden Training Course on Remote Sensing Education for Educators	11 May-12 June 1992	Stockholm/ Kiruna, Sweden	Develop knowledge and skills of university educators in remote sensing technology
3. UN/ESA/Planetary Society Workshop on Basic Space Science	July 1992 (4 days)	San José, Costa Rica	Promote cooperation among scientists from developed and developing countries on basic space sciences
4. Int. Conf. on Satellite Remote Sensing for Resource Management, Environmental Assessment & Global Change Studies: Needs & Applications in the Developing World	17-21 August 1992	Boulder, Colorado	Applications of Earth observation data for resource management, environmental assessment and global change studies in developing countries
5. Seventh UN/FAO/WMO/ESA Training Course on the Use of Visible, Infrared and Radar Systems in Hydrological and Agrometeorological Applications	Sept/Oct 1992	Nairobi (RCSSMRS)	Develop practical skills of user agencies in the application of Earth resources and environmental data from current and future satellites
6. 4th Int. Training Course on Remote Sensing Applications to Geological Sciences	October 1992 (3 weeks)	Berlin/ Potsdam	Provide education and practical training on the applications of airborne and satellite remote sensing techniques to geological sciences
7. United Nations Conference on Communications Technology for Development	November 1992 (4 days)	ESCAP	Address the roles of tele-communications in rural communications, telemedicine (remote health care and disaster medicine), disaster mitigation, tele-education and data transmission.

* The activities detailed herein are those on which individual reports will be issued. Other activities on which collective reporting will be provided are described in paragraphs 38, 40, 41, 49 and 50 as well as in the annex to the current report on United Nations ISY activities (A/AC.105/445/Add.6).

ANNEX II. LONG-RANGE FELLOWSHIPS OFFERED BY AUSTRIA, BRAZIL, CHINA AND THE EUROPEAN SPACE AGENCY WITHIN THE FRAMEWORK OF THE UNITED NATIONS PROGRAMME ON SPACE APPLICATIONS BEGINNING IN 1991-1992 a/ b/

Period	Country/ organizations	Subject	Financial support by host country/ organization	Offered	Selected	Applied	User countries (one or more candidates selected)
1991-1992	Austria	Telecommunications (microwave technology)	Subsistence allowance; installation grant; local transportation allowance; health and accident insurance	2	-	8	In progress
1991	Brazil	Research and applications in remote sensing	Subsistence allowance; medical and accident insurance	10	7	15	Zambia (1) Ghana (1) Ethiopia (1) Kenya (1) Nigeria (2)
1991-1992	China	Geodesy, photogrammetry and remote sensing	Subsistence allowance; medical insurance	2	2	4	Malaysia (1) Peru (1)
1991-1992	European Space Agency	Satellite meteorology	Subsistence allowance	1	1	15	Brazil
1991-1992	European Space Agency	Space antennae and propagation	Subsistence allowance	1	1	14	Brazil
1991-1992	European Space Agency	Remote sensing information systems	Subsistence allowance	1	-	9	In progress
1991-1992	European Space Agency	Communications systems	Subsistence allowance	1	-	14	In progress
TOTALS				18 c/	11 c/	79 c/	

a/ These fellowship awards were made on the basis of: (1) the background and qualifications of nominated candidates; (2) the evaluation and recommendations of the United Nations; and (3) the analysis and final decision of the Government/organization/institution awarding the fellowship.

b/ Awaiting clarification on long-term fellowships offered by the Soviet Union.

c/ These figures refer to the fellowship programmes processed as of 21 November 1991.